

THE *Calendar* for 1895-96 of the Queen's College, Galway, contains an alteration in the statutes referring to scholarships. We notice that from the beginning of the Session 1896-97, all scholarships and prizes will be open to students of either sex; junior scholarships in arts of the second year will be tenable for one year only. After the close of the Session 1897-98, the third year's scholarship in law and the senior scholarship or exhibition in the same subject will be abolished.

THE tenth summer meeting of the Edinburgh University Extension Movement will be held at University Hall, Edinburgh, from August 3 to August 29. Among the courses of lectures which have been arranged are philosophy and social science, by Prof. Patrick Geddes; the relation between science and philosophy, by Dr. R. M. Wenley; African scenery as influenced by climate, by Mr. Scott Elliot; psychology, education and physiology, hygiene, biology, geography and geology. There will also be several conferences for the discussion of educational problems of the present day. The comprehensive character of the programme should attract a large number to the meeting.

IN the House of Commons on Tuesday, Mr. Carvell Williams asked the First Lord of the Treasury whether the Parliamentary grant to King's College would not only be restored, but considerably increased; and, if so, whether provision was made for such increase in the present Estimates or whether it would be otherwise provided. In reply, Mr. Balfour said no increase was proposed this Session in regard to King's College. In accordance with an undertaking given by the Chancellor of the Exchequer to a deputation which waited upon him, he has appointed three gentlemen, Mr. T. H. Warren, President of Magdalen College, Oxford, Prof. D. G. Liveing, and Mr. Chalmers, of the Treasury, to visit the colleges sharing in the grant made to universities and colleges in Great Britain, and to investigate the character and quality of the university work done, and to inquire generally into the position which each college occupies both financially and in other respects. When their report is received, which the Chancellor of the Exchequer expects will be some time in the autumn, he will be in a position to judge whether a case has been made out for recommending Parliament to increase the sum to each of the colleges sharing in the grant.

FROM *Science* comes news of a notable extension of the University of Pennsylvania, by the establishment of a large number of graduate scholarships and fellowships. Provost Harrison gave 500,000 dols. to the university last June, "for the encouragement of liberal studies and the advancement of knowledge." The specific purposes of the fund are as follows: (1) The establishment of scholarships and fellowships intended solely for men of exceptional ability. (2) The increasing of the library of the university, particularly by the acquisition of works of permanent use and of lasting reference to and by the scholar. (3) The temporary relief from routine work of professors of ability in order that they may devote themselves to some special and graduate work. (4) The securing of men of distinction to lecture, and for a time to reside at the university. Our contemporary states that in pursuance of the end in view in the foundation, definite action has been taken in the establishment of a considerable number of graduate scholarships and fellowships. The recommendations which were made regarding these have been approved and will now go into force. There are eight graduate scholarships giving free tuition and 100 dols. open to those coming from the liberal courses in the college of the university; and there are, with the Hector Tyndale Fellowship in Physics, now fifteen fellowships, fourteen of which, coming from this foundation, are open to students of any university. The amount of the tuition deducted from the full value of the fellowship (600 dols.) does not go into the general funds of the university, but may be used for the purchase of books or apparatus which will aid the student in his work, or may be used in the publication of theses. A somewhat unusual feature is the establishment of senior fellowships, open only to those who have taken the Doctor's degree in the University of Pennsylvania. This amounts to the introduction, in a modified form, of the "Docent" system of German universities, the object being not at all to use the Senior Fellow as a teacher for the sake of the value he may be to the university, but to test him and give him an opportunity to do a little teaching in the direct line of his special work. From the Senior Fellowships there is no reduction for tuition. This gives eight Graduate Scholarships, fifteen Fellowships, and five Senior Fellowships, making twenty Fellow-

ships in all. Fourteen of the Fellowships are open to men from other institutions, but the Senior Fellowships are limited to those having taken the Doctor's degree from the university in order that some of the best men may be kept in residence there as long as possible, and their influence felt among the students.

SCIENTIFIC SERIALS.

American Journal of Science, March.—Trinidad pitch, by S. F. Peckham and Laura A. Linton. This paper gives an account of the physical and chemical properties of pitch from the Pitch Lake of Trinidad, together with a map of the lake itself. A dry sample of the true lake pitch contained 34.2 per cent. petrolene, 18.8 per cent. asphaltene, 11.4 per cent. of other organic matter, and 35.6 per cent. of inorganic matter. The pitch as it occurs is a unique substance found nowhere else in nature. It consists of a mixture of bitumen, water, sand, decayed vegetation, and gas in such definite proportions that within certain limits the composition of the entire mass is uniform.—Proofs of the rising of the land round Hudson Bay, by Robert Bell. The old shore-lines in the provinces of Ontario and Quebec slope upward in a north-easterly direction at rates varying in different regions from a few inches to a foot and even two feet per mile. Many former landing-places about the bay are now high and dry. The rising is apparently still in progress.—Experiments upon the kathode rays and their effects, by A. W. Wright. In developing "shadowgraphs," it is better not to use any alkaline accelerator at all until just at the end of the process. Röntgen rays passing through glass walls do not show magnetic deflection or mutual repulsion; but when they are made to pass through gold-leaf instead, they show traces of these phenomena, probably owing to the fact that they carry with them small portions of volatilised and electrified metal.—Triangulation by means of kathode photography, by John Trowbridge. The principle of triangulation may be applied to kathode photography when determining the situation of metallic particles in the body. By using two vacuum tubes in different positions, two pictures of, say, a bullet embedded in a hand may be obtained, and their distance apart gives the depth at which the bullet may be sought.—Notes of observations on the Röntgen rays, by H. A. Rowland, N. R. Carnichael, and L. J. Briggs. Some photographs of a coin obtained by Röntgen's method showed no penumbra when the coin was 2 cm. from the plate. In a very high vacuum tube the source of the active rays was distinctly traced to the anode.

THE *Meteorologische Zeitschrift* for March contains some interesting results of meteorological observations made at Boroma, on the Zambesi, lat. 16° S., long. 33° 12' E., in the years 1891-92. The most prominent feature of the climate is the contrast between the dry and the wet seasons. The approach of the rainy season is announced by lightning in the north and north-east during October; rain commences in November, and continues, on and off, for about five months; hail also occasionally occurs during thunderstorms. The dry season commences in April, and until the following November no measurable quantity of rain falls. It is noteworthy that during seven dry months, under a tropical sun, vegetation is not arrested, although even slight dew is very rarely observed. The daily barometric range is very regular, and amounts to about 0.15 inch. The atmospheric waves are so similar that the barometric curves overlie each other as nearly as possible; depressions such as are frequent in our latitudes do not occur at any part of the year; even the passage of thunderstorms is not shown upon the barograph traces. The absolute maximum temperature recorded was 109° 9, in November, and the minimum 54° 5, in August. The annual rainfall amounted to 29.6 inches, of which 10 inches fell in December. The greatest amount observed in twenty-four hours was only 1.9 inch.

THE last fascicule of the *Memoirs (Travaux)* of the St. Petersburg Society of Naturalists (vol. xxv. livr. 2), which is entirely given to the works done in the zoological laboratory of the St. Petersburg University, contains an interesting monograph, by B. Sukatchoff, on some new forms of sponges from Lake Baikal. The dredgings were made in the south-western part of the lake, near the issue of the Angara, by means of an apparatus similar to the one used by the *Challenger* expedition, the greatest depth reached being 492 feet. The greatest depth at which sponges were found was 273 feet. Most of the sponges obtained belong to already known species of *Lubomirskia*, described by

Dybowski in 1880; but some of them must be considered as new varieties, or as new species of the same genus. Thus the author describes and figures the new varieties: *Lubomirskia baicalensis*, Pall., var. ϵ , and *Lubomirskia intermedia*, Dyb., var. β , and the new species, *L. Tcherskii* and *L. fusifera*. The paper is fully summed up in French. The same number contains a note on *Polyzonium germanicum*, Brandt, by M. Rimsky Korsakoff; a paper, by W. Schimkevitch, on some new species and varieties of *Pantopoda* from the Arctic Ocean (Barents's Sea), in which the new forms *Ammonothea borealis*, *Nymphon rubrum*, var. *intermedium*, *Nymphon grossipes*, var. *armatum*, *Tanystylum hakianum*, *Phoxihilus bahmii*, are described and figured. The author also gives the plates which are intended to show that the two species, *Phoxihilus vulgaris* and *Ph. charybdeus*, are different. M. Eugène Schultz describes the new species *Loxosoma harmeri*; and A. Yaschenko gives a catalogue of the fishes in the museum of the St. Petersburg University.

SOCIETIES AND ACADEMIES.

LONDON.

Royal Society, February 27.—"A Method for rapidly producing Diphtheria Antitoxines." Preliminary note. By Dr. G. E. Cartwright Wood.

In this preliminary communication¹ a method was described by means of which, firstly, an animal can be rendered immune towards large quantities of diphtheria poison; secondly, such animals can be made to produce powerful diphtheria antitoxines. The distinctive feature of the method consists in the use of the products produced by the growth of the diphtheria bacillus in albuminous fluids made by the addition of serum to ordinary peptone broth. This fluid is, after three or four weeks' growth at 37° C., filtered through a Chamberland candle and heated for an hour at 65° C. This liquid, which is described as "serum" toxine, probably depends for its action on the presence of the diphtheria albumoses described by Sidney Martin. It gives rise on injection to little or no local reaction, but to a marked rise of temperature, which is still more pronounced when the injection is repeated. The ordinary toxine obtained by the growth of the diphtheria bacillus in fresh peptone broth, or in putrid broth (Spronck's method), was also made use of, and this is referred to in the paper as "broth" toxine.

In the first experiment (Horse No. 1) 380 c.c. of serum toxine was injected during the first fourteen days for the purpose of immunising the animal, and thus protecting it against the subsequent introduction of the much more irritating and deadly broth toxine. During the next fortnight it then received 310 c.c. of broth toxine in three injections without being markedly affected, and was then bled at the end of this period. The antitoxic value of the serum was then found to be ten normal units, 1/100th of a c.c. protecting against ten lethal doses of broth toxine, a result obtained by the ordinary method only after ten weeks treatment.

In the second experiment (Horse No. 2), the animal received 1350 c.c. of serum toxine mixed with 51 c.c. of antitoxine during the first fortnight. During the next two weeks it received 950 c.c. of broth toxine mixed with 350 c.c. of serum toxine. When the animal was bled at the end of a month, 1/1000th c.c. was found to protect a guinea-pig against ten lethal doses of broth toxine.

In the third experiment (Horse No. 3), the horse received the serum toxine without the addition of antitoxine, and, as will be seen from the following table, the results were even more striking.

	Antitoxic value of serum.	Amount of toxines injected.
7th day ...	$\frac{1}{300}$ c.c. ...	1200 c.c. serum toxine.
14th day ...	$\frac{1}{300}$ c.c. ...	980 c.c. serum toxine.
21st day ...	$\frac{1}{300}$ c.c. ...	650 c.c. serum toxine and 1050 c.c. weak broth toxine.
28th day ...	$\frac{1}{1250}$ c.c. ...	1100 c.c. serum toxine and 1200 c.c. stronger broth toxine.

The high antitoxic value of the serum obtained from horses Nos. 2 and 3 suggested that the serum toxine might be made

¹ The investigation has been carried out in the laboratories of the Royal Colleges of Physicians and Surgeons, and I should like here to express my great indebtedness to the Laboratories Committee for the facilities there afforded to me. I must also thank them and, through them, the Honourable Goldsmiths' Company, from whose Research Fund a grant was placed at my disposal.—G. E. C. W.

use of at a later stage, as well as for the purpose of rapidly immunising the animals. When mixed with the ordinary toxine, and injected as usual, although the results obtained were better, they were not so striking as one might have expected. On examining more in detail the protocols of the horses in which the best results had been obtained, it was observed that these had been under more or less continuous treatment with the toxines, both toxines being injected in as large amounts, and as frequently as possible, so that the animal was kept in a chronic condition of local and constitutional reaction. For the purpose of determining whether the favourable result was due to this "cumulative" action of the toxines, four horses, which had been under the ordinary treatment for periods varying from nine months to a year, were treated in the following way. They received one evening each 300 c.c. of serum toxine prepared by Spronck's method, and on the following morning an injection of weak broth toxine, the latter being usually repeated daily during the rest of the week. This treatment was continued during the following week, and the serum then tested for its antitoxic value. The results are seen in the following table.

	Strength of serum before treatment.	Strength of serum after 16 days' treatment.	Amounts of toxines injected during the 16 days.
Horse No. 4 ...	$\frac{1}{600}$ c.c. ...	$\frac{1}{2000}$ c.c. ...	650 c.c. serum toxine and 2350 c.c. weak broth toxine.
Horse No. 5 ...	$\frac{1}{400}$ c.c. ...	$\frac{1}{1500}$ c.c. ...	600 c.c. serum toxine and 1800 c.c. weak broth toxine.
Horse No. 6 ...	$\frac{1}{300}$ c.c. ...	$\frac{1}{750}$ c.c. ...	650 c.c. serum toxine and 2350 c.c. weak broth toxine.
Horse No. 7 ...	$\frac{1}{400}$ c.c. ...	$\frac{1}{750}$ c.c. ...	650 c.c. serum toxine and 2350 c.c. weak broth toxine.

These results indicate clearly that the rapid productions of anti-toxine depended on the increased sensitiveness of the animal, owing to the injections being repeated before the previous ones had had time to pass off. Some preliminary experiments have indicated that this cumulative action may be produced in an even more marked degree by the use of other toxines than those produced by the diphtheria bacillus.

It is claimed for this method that powerful diphtheria antitoxines can be easily produced in a shorter space of time than has hitherto been possible, and that, as a consequence, the amount of serum necessary to be injected is greatly reduced, while its greater strength will permit of the patient receiving at the beginning of treatment a sufficient quantity of the serum at one injection, when, as is universally recognised both by animal experiment and clinical experience, its curative action is exerted most markedly.

March 19.—"On the Relations of Turacin and Turacoporphyrin to the Colouring Matter of the Blood." By Prof. Arthur Gamgee, F.R.S.

In a recent paper read before the Royal Society, the author has shown that the intense absorption band in the extreme violet, which is observed in the spectrum of highly diluted solutions of hæmoglobin and its compounds, is (with slight changes in its position) exhibited by certain of the derivatives of the blood colouring matter, e.g. by hæmochromogen and the compounds of hæmatin, and by that remarkably interesting coloured but iron-free derivative of the latter body, hæmatoporphyrin.

Having found that no organic body which he had examined exhibits an absorption band occupying the position, or possessed of the remarkable intensity, of the extreme violet band under discussion, it seemed as if the latter owed its origin to a group of atoms existing in, and perhaps characteristic of, the blood colouring matter, which group remains intact in certain of the products of decomposition of the complex hæmoglobin molecule, whereas it does not exist in certain other of the derivatives of the hæmochromogen or hæmatin moiety of the molecule, such as bilirubin and urobilin. It appeared interesting to determine whether turacin, which, as Prof. Church first showed in 1869,¹ presents two absorption bands in the visible spectrum, which have a remarkable resemblance to those of oxy-hæmoglobin,

¹ A. H. Church, "Researches on Turacin, an Animal Pigment containing Copper," *Roy. Soc. Proc.*, vol. xvii. (1869) p. 436; *Phil. Trans.*, vol. clx. (1869) pp. 627-636.